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Brief Communication

Statistical consulting in health-care research: a vocabulary for non-statisticians

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Abstract

Statistical consultation has recently increased in medical and health research. Most medical researchers do not have the time to learn specialist statistical knowledge and abilities in addition to their clinical experience in many medical fields. There have been numerous reports about statistical misuse and errors in published health-care studies. This has raised concerns about the nature of statistical consultation. The role of biostatisticians in health research is unclear. This study discusses several aspects of statistical consultation, such as definition, the consultant's essential knowledge and skills, the structures of a successful consultation, and the ethical roles of both statistician and researcher. The purpose of this article is to educate scholars about statistical consultancy.

Keywords: Statistics, Consultation, Health care, Research, Ethics

What is statistical consultation?

Statistical consultation is the collaboration of a statistician and other researchers to manage and solve research challenges (1). The statistician helps researchers do methodically sound research. A biostatistician's training in applied statistics lends credibility to study. A statistical consultant offers statistical and methodological guidance on study design, data collection, analysis, and presentation, as well as findings distribution (2,3-5). Statistical consultation might take place in a statistician's office, a researcher's office, or in the field while data is being collected.

Characteristics of statistical consultant

An effective statistical consultant in health research typically has a background in medicine, a second degree in medical statistics or epidemiology, computer proficiency, experience with statistical software (e.g., SAS, Stata, or SPSS), and good written and verbal communication skills to interact comfortably and fluently with the researcher using scientific medical and statistical terms. The consultant's experience includes handling data quality, planning research, statistical analysis and interpretation, measurement and sampling techniques, and grant application processes (4,6–10).

What does the statistician do?

Depending on the requirements and resources of the project, a statistician may work as an advisor, collaborator, partner, or member of a research team. From planning to publication, the statistician might be involved in every aspect of the study process (4,11). A statistical consultant's responsibilities span several stages of the study project. These roles are compiled in Table 1.

Ethical issues in Statistical Consulting

A good guide outlining these ethical considerations was released by the American Statistical Association. The consultant for statistics ought to (4,12,13):

1. Demonstrate competence, skill, attention to detail, self-respect, and regard for other researchers,
2. Ensures proper statistical work and informs investigators of the limitations of findings in addressing the research issue,
3. Describes the study's strengths and limitations, methodology, and data analysis, with the goal of supplementing the scientific report,
4. Ensures that information on people or animals is kept private and that their rights are always protected during the research,

Table 1: Roles of statisticians in different phases of the study (4,11,16)

Phase	Roles
Before data collection	Writing a proposal/protocol, defining the target population, calculating sample size, sampling method, blinding/masking, randomization, building and verifying questionnaires and tools, data analysis strategy, and maximizing resource efficiency.
During the study	Supervision and quick resolution of any problems in randomization difficulties, data quality and integrity, recruitment, retention, or adherence, modifications to trial design/sample size, interim analyses, and data management strategy.
After data collection	- Data analysis with appropriate statistical methods, - Recommend the best manner to describe and convey data, - Presentation of results (tables and graphs).
After data analysis	- Results Interpretation, - In the abstract and complete manuscript, write a methods section, results, and data analysis paragraphs, - To avoid erroneous or incomplete conclusions, ensure that the conclusions match the findings, - Disseminate findings to scientific journals, conferences, regulatory bodies, and so forth, - Respond to criticisms from reviewers on technique and statistical analysis.
After publication	Respond to comments from journal editors, readers/audiences, policymakers, and so on.

5. Scheduling the shared responsibilities of a heterogeneous research team,
6. Respects and collaborates with other statisticians,
7. Avoids misbehavior and accepts its investigation and claim,
8. Avoids the distribution of incorrect or misleading statistical information,
9. Promotes data integrity and opposes pressure to match the researcher's planned aims,
10. Discloses any known or suspected conflicts of interest and restrictions, biases, or defects that could jeopardize the validity of the results.

Biostatistician acknowledgement

A statistician works as part of a large research team on a large project. Significant efforts and contributions of statisticians to research initiatives should be recognized collaboratively in suitable ways, such as co-authorship, acknowledgement, and pay for consultation. A consultation fee may be fixed for the duration of the project or determined by time, costs, and project budget (4).

Conclusion

Many medical journals do not have their manuscripts reviewed by independent statisticians (14). This raises questions regarding the validity of research findings, especially considering recent allegations of statistical mishandling in health-care research (15). Biostatisticians work in the realm of medical and health care research to create, implement, and apply statistical methodologies. In the age of evidence-based medicine, requesting educated statistical consultation at the outset of a study is unavoidable.

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